

USGCRP Interagency Working Group on Integrated Observations

AGU Town Hall

Sally McFarlane (DOE) Barry Lefer (NASA), Diane Stanitski (NOAA)

December 11, 2017

U.S. Global Change Research Program

USGCRP comprises **13 Federal agencies** that conduct or use research on global change and its impacts on society



*“... assist the Nation and the world to **understand, assess, predict** and **respond** to human-induced and natural process of global change”*

Global Change Research Act, 1990

USGCRP's four strategic goals:

- **Advance Science** - Advance scientific knowledge of the integrated natural and human components of the Earth system to understand climate and global change.
- **Inform Decisions** - Provide the scientific basis to inform and enable timely decisions on adaptation and mitigation.
- **Conduct Sustained Assessments** - Build sustained assessment capacity that improves the Nation's ability to understand, anticipate, and respond to global change impacts and vulnerabilities.
- **Communicate and Educate** - Advance communication and education to broaden public understanding of global change and develop the scientific workforce of the future.



USGCRP Sustained Assessment & Related Activities at AGU

- *Fourth National Climate Assessment (NCA4) Vol. I: Climate Science Special Report* – science2017.globalchange.gov
 - An authoritative report of the physical science of climate change with a focus on the US
 - Represents the scientific consensus on climate science in America
 - At AGU - [Union Session on the Climate Science Special Report \(U23A\)](#)
- *NCA4 Vol II: Climate Change Impacts, Risks, and Adaptation in the United States*
 - Report assesses a range of climate change impacts, helping decision makers better identify and manage climate-related risks
 - Available for public review and comment until January 31, 2018
 - At AGU - [Sustained Assessment session \(GC31H and GC33E\)](#).
- *2nd State of the Carbon Cycle Report (SOCCR-2)*
 - Assesses the state of the carbon cycle across North America, emphasizing advances in the understanding of carbon cycle science and associated human dimensions
 - Available for public review and comment until January 8, 2018
 - At AGU – [SOCCR sessions \(B41G and TH23I\)](#)
- USGCRP Booth ([#745](#)) in the Exhibition Space.



USGCRP Interagency Working Groups

USGCRP has a broad range of interagency working groups that implement and coordinate global change research activities within and across agencies

- [Adaptation Science Interagency Working Group](#)
- [Carbon Cycle Interagency Working Group](#)
- [Education, Extension, and Training Interagency Working Group](#)
- [Global Change Information Interagency Working Group](#)
- [Indicators Interagency Working Group](#)
- [Integrated Observations Interagency Working Group](#)
- [Interagency Crosscutting Group on Climate Change and Human Health](#)
- [Interagency Group on Integrative Modeling](#)
- [International Activities Interagency Working Group](#)
- [Process Research Coordinating Committee](#)
- [Scenarios and Interpretive Science Coordinating Group](#)
- [Social Sciences Coordinating Committee](#)



Interagency Working Group on Observations (ObsIWG)

- The Observations Working Group (ObsIWG) facilitates the exchange and coordination of observations capabilities and observation technique-related research relevant to climate and related global change within the participating agencies of USGCRP.



Interagency Coordination

- Interagency coordination on observational activities has many flavors:
 - Can be initiated by federal program managers or by the community
 - Can consist of equal participation/support by multiple agencies or consist of a lead agency with contributions from other agencies
 - Includes leadership and participation in workshops, reports, and many other strategic planning activities
 - Includes participation in international activities, networks, and organizations
- Focus today on several types of concrete observational activities with interagency aspects or opportunities:
 - Observational networks
 - Research sites
 - Field campaigns



Town Hall

- Goals:
 - Inform community of the many flavors of existing observational activities that include interagency coordination
 - Engage the community on ideas for strengthening interagency coordination
- Outline:
 - Brief presentations by program managers or project managers/principal investigators of several observational activities
 - What is the scientific goal of your activity?
 - In what way does your activity currently have inter-agency coordination or participation? How was that inter-agency coordination or participation developed?
 - What are ways that other agencies/investigators could be involved or contribute?
 - What are obstacles to inter-agency coordination that you have experienced? How have you overcome them?
 - Moderated discussion on ideas for increased interagency coordination of observational efforts



Town Hall Presentations

- Global Ocean Acidification Observing Network (GOA-ON) and Integrated Ocean Observing System (IOOS)
 - Participant: Wei-Jun Cai, University of Delaware
- Atmospheric Radiation Measurement (ARM) research sites
 - Participant: Jim Mather, Pacific Northwest National Laboratory
- NOAA Atmospheric Baseline Observatories
 - Participant: James Butler, NOAA ESRL
- PANDORA trace gas measurements network
 - Participant: Bob Swap, NASA
- DYNAMO (Dynamics of the MJO) field campaign
 - Participant: Chidong Zhang, NOAA PMEL
- ABOVE (Arctic Boreal Vulnerability Experiment) field campaign
 - Participant: Hank Margolis, NASA
- LTER (Long-Term Ecological Research) network
 - Participant: Michelle Mack, Northern Arizona University



Global Ocean Acidification Observing Network (GOA-ON) and Integrated Ocean Observing System (IOOS)

Wei-Jun Cai

University of Delaware



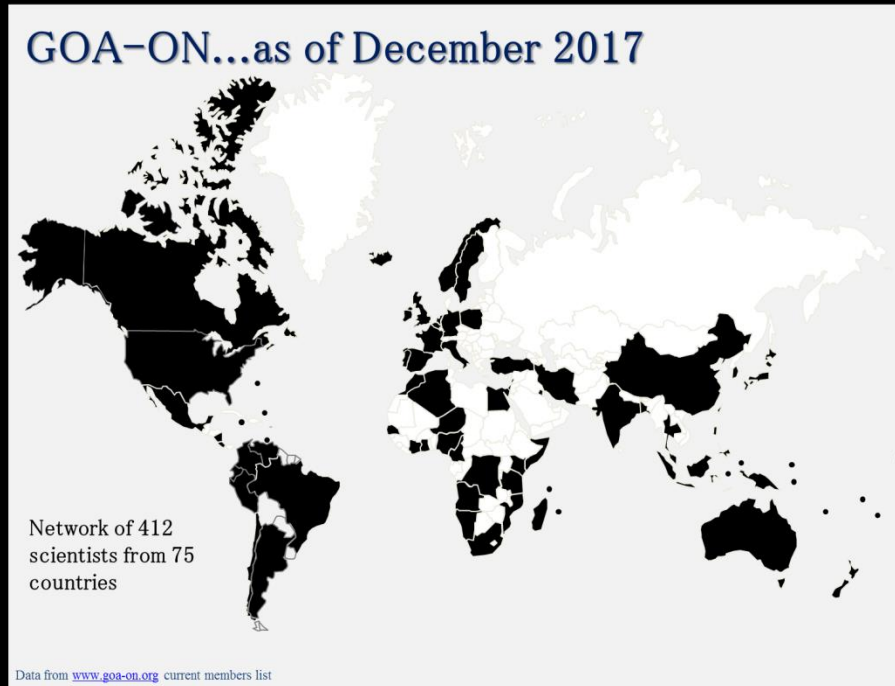
Three high level goals:

1. Improve our understanding of OA conditions
2. Improve our understanding of ecosystem response to OA
3. Acquire and exchange data and knowledge required to optimize forecasts for OA and its impacts

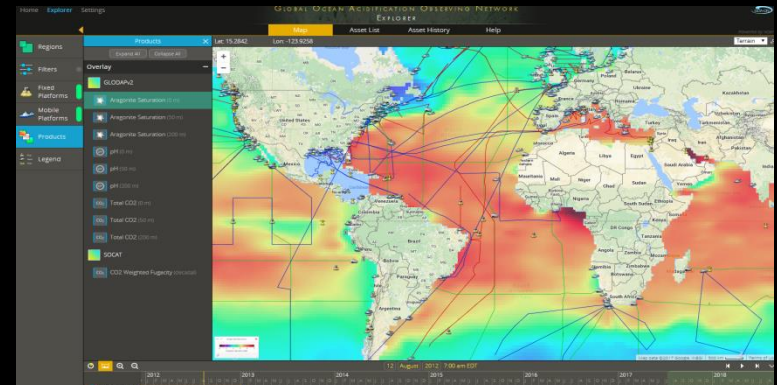
Recent updates:

- GOA-ON recognized by the UN General Assembly
- “Distributed secretariat” being stood up

Membership



GOA-ON data portal



U.S. IOOS®: Program Overview

Coastal Component

- 17 Federal agencies
- 13 regional partners
- Academia & Industry

Global Component

- US contribution to GOOS
- 63% of the Global Climate Ocean Observing System completed

Mission Areas

Grow our Blue Economy by

- Predicting Weather & Climate variability
- Supporting Safe & Efficient Transportation and Commerce
- Preparing Risk Reduction for Coastal Communities

Integrated Coastal Ocean Observing System (ICOOS) Act (P.L. No 111-11, March 2009)

Partnership effort that leverages dispersed national investments to deliver ocean, coastal and Great Lakes data relevant to decision-makers



Atmospheric Radiation Measurement (ARM) Research Facility

Jim Mather

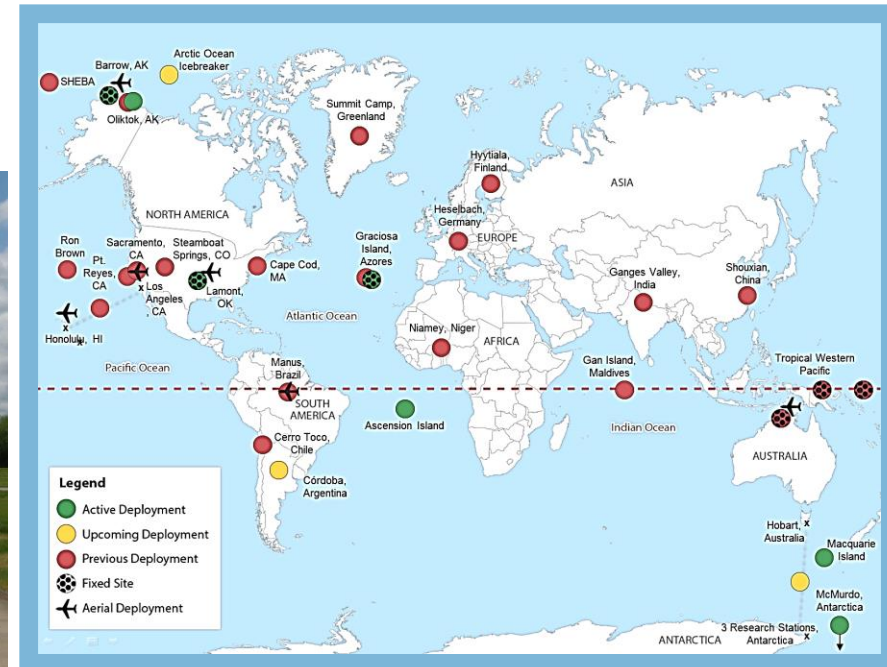
Pacific Northwest National Laboratory (PNNL)

The DOE Atmospheric Radiation Measurement (ARM) Climate Research Facility

ARM

ARM Vision Statement

To provide a detailed & accurate description of the earth atmosphere in diverse climate regimes to resolve the uncertainties in climate and earth system models toward the development of sustainable solutions for the Nation's energy & environmental challenges.



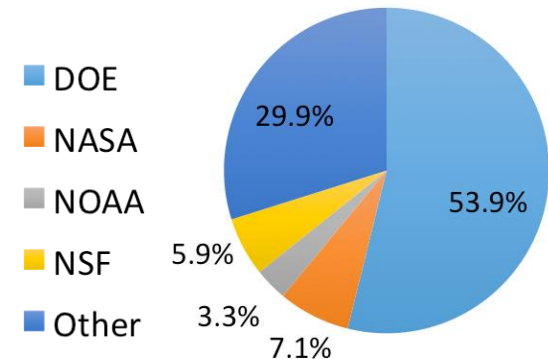
Interagency Engagement

Mechanisms for Engagement

- Participation in international conferences
- Participation multi-agency field campaigns
- Open data access attracts broad array of science users
- Open access to ARM facility resources (field observatories, computing facilities, and staff)
- Outreach to entrain specific domain expertise



Distribution of ARM science users by primary funding source



Obstacles

- Moving funds across agencies
- Tendency to focus on internal facilities
- Understanding of processes

NOAA Atmospheric Baseline Observatories

Jim Butler

NOAA Earth System Research Laboratory, Global Monitoring
Division

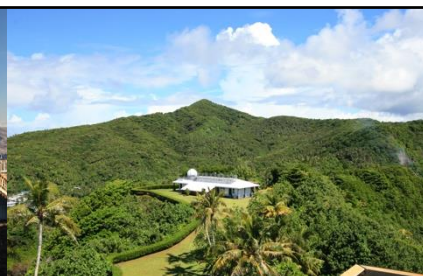
Interagency Collaboration at NOAA's Atmospheric Baseline Observatories



Barrow, AK



Mauna Loa, HI

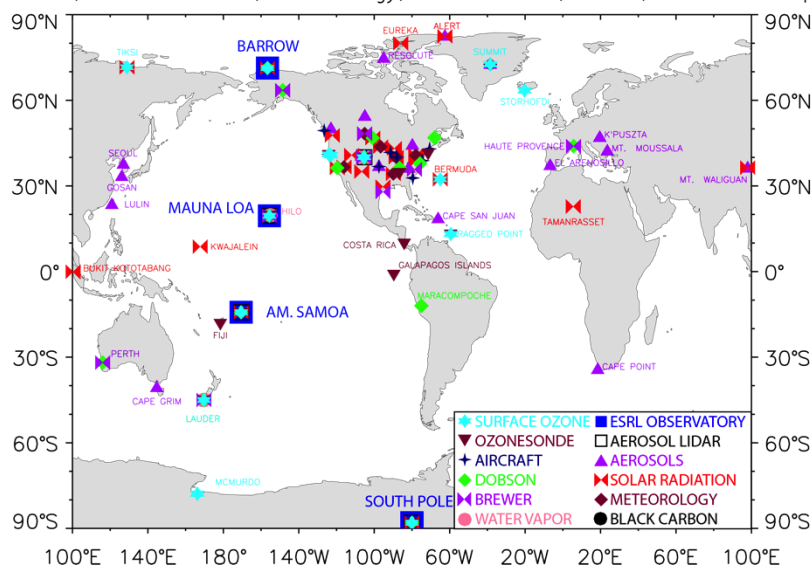


Tula, American Samoa

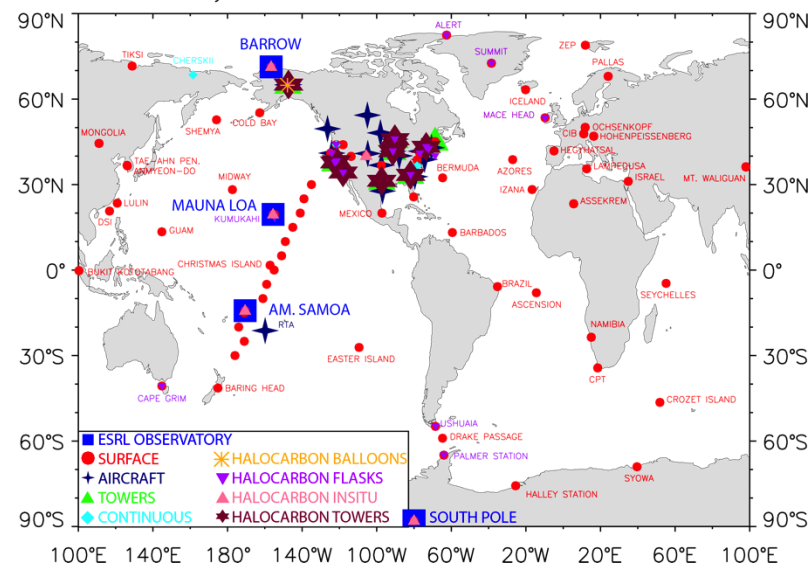


South Pole, Antarctica

Aerosols, Solar Radiation, Meteorology, Black Carbon, Ozone, and Water Vapor



Carbon Cycle Greenhouse Gases and Halocarbon Gases

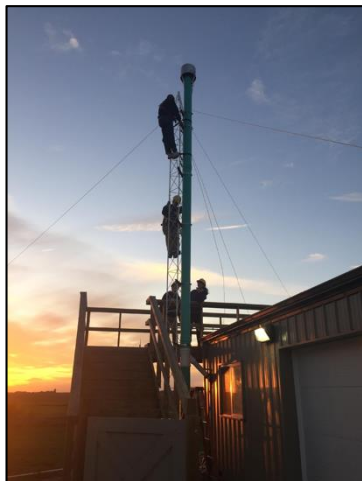


James H. Butler, Director
Global Monitoring Division
NOAA Earth System Research Laboratory
Boulder, Colorado 80305 USA

Cooperative Research Projects



Ozone & Water Vapor
balloon flight in Boulder



Aerosol stack upgrade at
Bondville, IL



Barrow, AK Atmospheric Baseline Observatory

- Both scientific and operational collaboration.
- Currently supporting ~70 projects across the observatory network.
- NSF, DOE, NASA, DOI (USGS, BLM & USFWS), DHS (USCG & FEMA), Postal Service, GSA, & DOD (Air Force, Army & Navy) collaboration.
- *We get a lot from our data...
We get a lot more when we partner!*



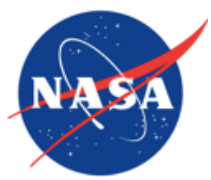
Sunrise balloon launch time-lapse at South Pole

Observatory Cooperative Project Contact: Brian Vasel, brian.vasel@noaa.gov, 303-497-6655

PANDORA trace gas measurements network

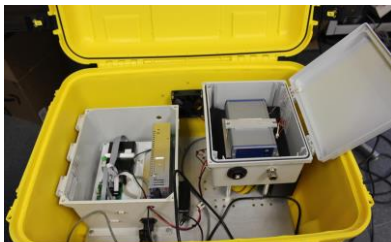
Robert Swap

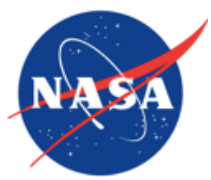
NASA Headquarters, Radiation Sciences Program



Pandora Spectrometer System

- Developed at NASA Goddard Space Flight Center with support from NASA HQ
- Ground-based direct sun/moon & sky scanning remote sensing for air quality and atmospheric composition (1S - ~270 – 530 nm, 0.6 nm; 2S – 400 – 900 nm, 1 nm)
- NRT Standard Operational Products at high frequency (~ 2 mins)
 - Total Column Ozone (+/-15 DU, ~5%); Total Column NO₂ (+/-0.05 DU, ~10%)
- Additional non-validated products
 - HCHO - Total column, trop. & near sfc; NO₂, O₃ – trop. & near sfc
- Successfully deployed for multiple field campaigns (e.g. DISCOVER-AQ, KORUS-AQ, LMOS and OWLETS) as well as long-term monitoring.





NASA Pandora Project

- Project engaged agencies (e.g. EPA, NOAA, various state agencies) while participating in field campaigns (e.g. DISCOVER-AQ, KORUS-AQ, LMOS & OWLETS)
- Interagency interest related to modest instrument cost and future atmospheric satellite missions (TROPOMI & TEMPO) highly relevant to agency missions re. observing and complying with air quality standards (e.g. O₃, NO₂, SO₂, PM_{2.5} and HCHO).
- Pandora Project strategy informed by those campaigns is to tie measurements to US AQ network and leverage existing logistical and observational infrastructure
- Currently 30 in US (20 NASA, 4 EPA, 5 SciGlob, 1 NOAA instruments). Pandora Project on track to complete an additional 25 1S instruments by July 2018
- NASA Pandora Project in collaboration with ESA through Luftblick currently developing the Pandonia Global Network (PGN) along lines of AERONET to provide global community with standardized and validated long-term AQ and AC observations to support ground-based, in-situ and satellite missions



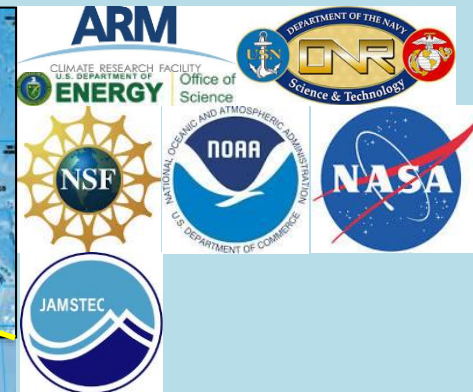
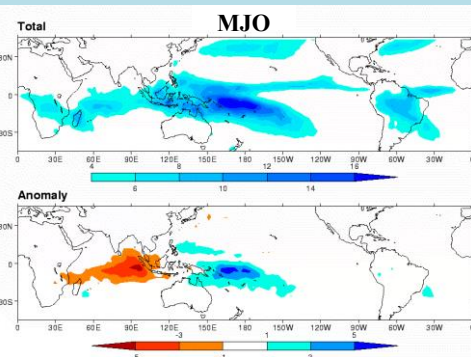
DYNAMO (Dynamics of the Madden Julian Oscillation) field campaign

Chidong Zhang

NOAA Pacific Marine Environmental Laboratory

DYNAMO (Dynamics of the Madden-Julian Oscillation) Field Campaign

October 2011 – March 2012



Importance of the MJO:

- Bridge weather and climate
- Influence global high-impact events
- Provide a major source of predictability on seasonal-to-subseasonal (S2S) timescales

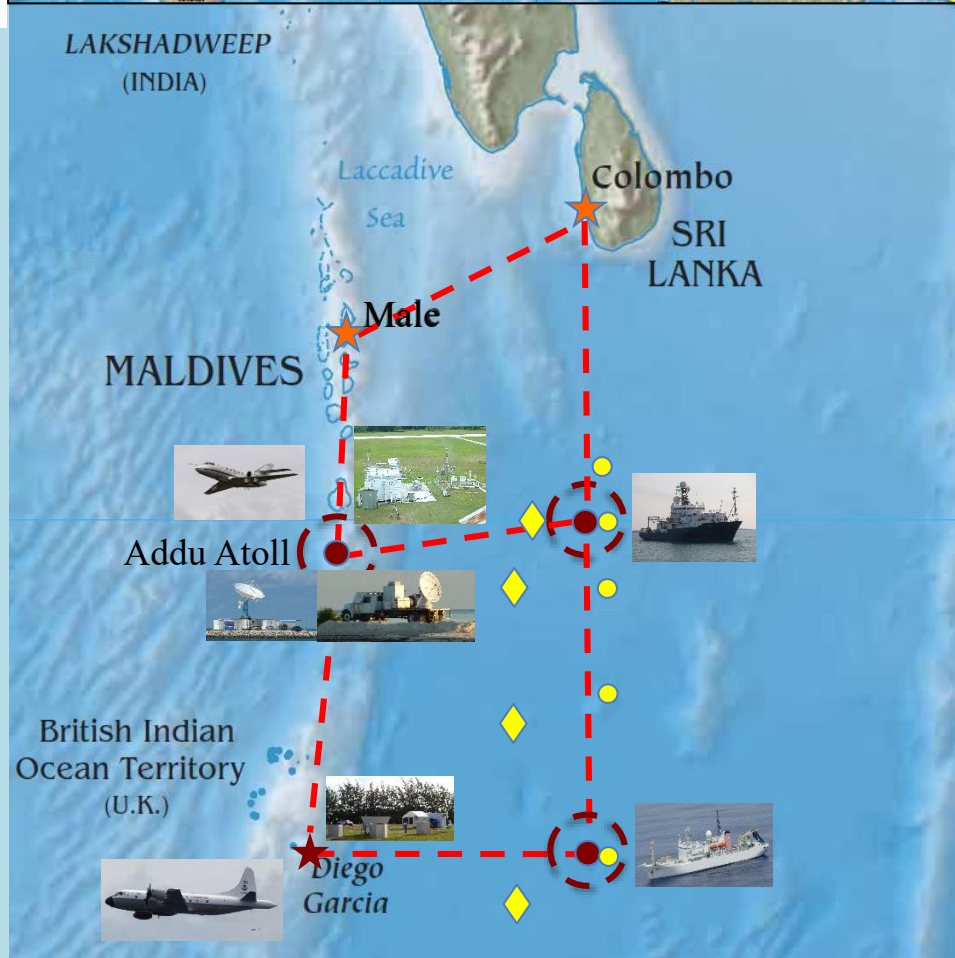
DYNAMO Goal:

To expedite our understanding of MJO initiation processes and efforts to improve simulation and prediction of the MJO

DYNAMO Hypotheses:

Three essential factors for MJO initiation are:

- Interaction between convection and its environmental moisture
- Distinct roles of different types of convective clouds at each MJO initiation stage
- Upper ocean processes and air-sea interaction



Participants:

16 countries
37 universities/80 students
32 national centers and laboratories

Data:

http://dynamo.fl-ext.ucar.edu/rsmas/dynamo_legacy/

Publications: ~200

What way does your activity currently have interagency coordination or participation?

- NSF and NOAA continue their support of data analysis and modeling.

How was that interagency coordination or participation developed?

- US Clivar (led by David Legler) played the key role in the interagency coordination and communication with the DYNAMO science team through interagency group meetings and Clivar Summits.
- Program managers from DOE ARM and ONR led the way of funding decisions and coordination.
- NOAA and NSF followed by providing aircraft, more ship time, and ground facilities. NASA donated a radar.
- The DYNAMO Project Office (led by Jim Moore of NCAR, supported by NSF) took care of most logistic tasks.
- All agencies worked closely to beat the short lead time for preparation.

What are ways that other agencies/investigators could be involved or contribute?

- More NASA involvement would have made the observations more useful to satellite retrievals.
- Post-field modeling coordination didn't happen.

What are obstacles to interagency coordination that you have experienced? How have you overcome them?

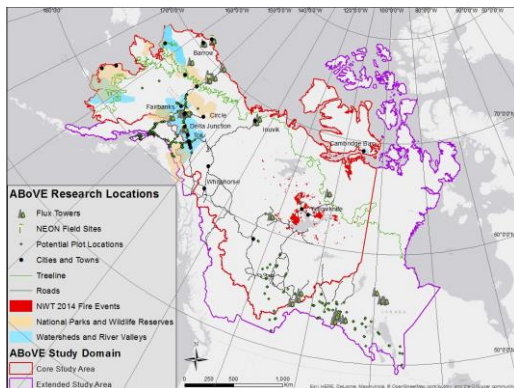
- Different proposal deadlines and review procedures
- Willingness of taking risks

ABOVE (Arctic Boreal Vulnerability Experiment) field campaign

Hank Margolis

NASA Headquarters, Terrestrial Ecology Program

ABOVE is a large-scale NASA-led study of environmental change in arctic & boreal regions and the implications for ecological systems and society



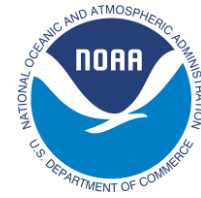
Our overarching Science Question is

How vulnerable or resilient are ecosystems and society to environmental change in the arctic and boreal region of western North America?

*Field and Modeling Projects: Carbon Cycling, Wildlife, Hydrology, Vegetation Dynamics, Wildfire
ABoVE Airborne Campaign 2017 (nine aircraft)*



US Partners are Essential to ABoVE's Success



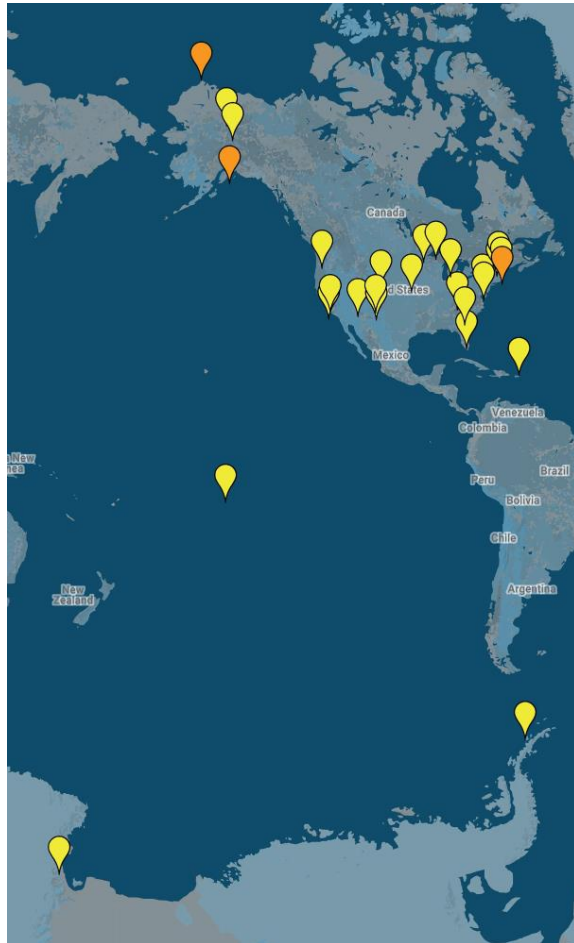
- 9 Federal Agencies
 DOE NGEE-Arctic
 NSF NEON, LTER, IRIS
 US Park Service
 BLM
 US Fish and Wildlife Service
 US Army Corps of Engineers
 USGS
 US Forest Service
 NOAA

- 3 State of Alaska Agencies
 Alaska Dept of Fish and Game
 Alaska Dept of Natural Resources
 Alaska Fire Science Consortium
- 1 Native/ Aboriginal Organization
- 56 US Universities/ Institutes
 379 US Science Team Members
 64 NASA Funded Projects

LTER(Long-Term Ecological Research) network

Michelle Mack

Northern Arizona University



- 28 sites
- 37 years
- 2300 investigators
- >5911 public datasets
- >16,000 journal articles

New sites in 2017:

- Northeastern U.S. Shelf (NES)
- Northern Gulf of Alaska (NGA)
- Beaufort Lagoon Ecosystem (BLE)

Agency partnerships and collaborations:

- US Forest Service
- US Geological Survey
- National Park Service
- USDA Agricultural Research Service and and Natural Resource Conservation Service
- NOAA
- Army Corps of Engineers and Department of Defense
- BLM
- EPA
- NEON

LTER CORE RESEARCH AREAS



PRIMARY PRODUCTION

POPULATIONS

DISTURBANCE

ORGANIC MATTER

INORGANIC MATTER

LAND USE/LAND COVER CHANGE

HUMAN-ENVIRONMENT INTERACTIONS

Five core themes have guided the designation of core datasets and formed the backbone for cross-site collaboration

- **Primary Production**
- **Population Studies**
- **Movement of Organic Matter**
- **Movement of Inorganic Matter**
- **Disturbance Patterns**

In addition, urban LTERs, and increasingly other LTER are particularly suited to tackle two additional themes:

- **Land Use and Land Cover Change:**
- **Human-Environment Interactions**